UBS Token

Technical Specification

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1. Introduction

1.1 Purpose of the Token

The Universal Basic Services token is algorithmically controlled relative to the current national inflation rate versus the Central Bank national inflation target. The purpose of it is to provide for essential basic services such as food and energy bills that are an inherent human right of every citizen – subject to security checks, such as whether money laundering or terrorism is at play.

2. General Overview and Design Guidelines/Approach

2.1 General Overview

Once a Central Bank Digital Currency is issued, the way is paved for the UBS token to be introduced. A CBDC will be a cryptocurrency as it is a digital currency that will reside within a blockchain. Tokens are a form of cryptocurrency that are intrinsically linked to a native coin on a blockchain. In this instance, each Central Bank will need to create their own bespoke blockchain with their CBDC as the native coin, allowing them to create their own national UBS tokens linked to the native CBDC.

2.2 Assumptions/Constraints/Risks

2.2.1 Assumptions

The major assumption is that a CBDC is in operation. Further to that, another assumption is that the government in power is willing to stake their political reputation on an unproven product that albeit could offer a novel way to temper inflation by both reducing and increasing the money supply through tokenisation of fiat.

2.2.2 Constraints

The major constraint is inflation, nationally and globally, along with national inflation rate targets. Beyond that, the cosntraints are technical in nature. How many citizens possess the technical hardware to withdraw the funds and can all mitigating security factors be handled?

- GDPR
- Financial Conduct Authorities
- Anti-money laundering
- Fraud prevention
- Anti-terrorism funding
- KYC verification

2.2.3 Risks

The risks revolve mainly around the fact that the token is purely digital, albeit exchangeable through the CBDC for fiat. Should a citizen be unable to access the token due to a technical fault, they may suffer increased living costs without recourse to pay the bills. The need then is clear that the token must be accessible offline as well as online. This model has been proven to work in China previously.

3. Design Considerations

The Central Bank(s) will need to decide upon the nature of their blockchain implementation, for instance will they account-based systems, PoC vs PoW etc.

3.1 Goals and Guidelines

The priority will be security at all times to ensure integrity of the system, to avoid any tampering or abuse and to maintain the reputation of government and the Central Bank whilst building further trust in the financial system having had setbacks such as the credit crunch and the general widening of inequality as a result of Quantitative Easing. This is an opportunity for the government and the city to bridge the gulf between them and the average household in terms of equality and the common desire for the economy to work for us all at all times regardless of external pressures and constraints on growth.

3.2 Development So Far

The software has so far been written in Java as far as operating the back-end for the Central Bank financial statements and supply/burn figures required for asset-purchase/token burn strategies. The digital wallets have been mocked up in MetaMask for presentation purposes to demonstrate the capability of UniSwap v3 to convert the UBS token into CBDC currency within an entirely digital framework.

However, the structure and implementation of a Central Bank blockchain remains undeveloped and will remain an issue for them to resolve based on their current infrastructure and plans for the future. As the technology develops, new strategies present themselves and the capability for the system to upgrade will be imperative as to not make the token system incapable of operating under new technological advances in the industry.

The choice of operating partner will impact heavily on this decision should they not wish to build, develop and maintain the system in-house. For example, the SWIFT messaging system is capable of delivering the XML messages required between the infrastructures required, but may be superseded by XRP from Ripple within the foreseeable future.

As a result, it would be preferable for the Central Banks to collaborate and allocate design and implementation to a central, global source that is technically equipped to handle different national requirements whilst remaining at the forefront of the digital economy revolution.

4. Financial Architecture

4.1 Initial Supply

The model is designed to cater for three variables: current national inflation rate, national inflation target and the national median wage in USD with purchasing power parity. With these three in mind throughout the algorithmic design, all outcomes over time will reduce the disparity between national inflation rates whilst merging national average wages with PPP, adjusted for inflation.

The first step is to take the national money supply that will be fully, or partially, converted to a digital supply once the CBDC is introduced so as to fund it. In the UK for example, the M0 figure from the Bank of England has been used. In this model, the assumption is the entire M0 figure is converted but it will vary from country to country. Over time, however, it is anticipated that they will all eventually become fully digital. This is regardless of whether the UBS token is introduced.

The supply figure used then needs to be multiplied by a ratio to generate the initial supply of the UBS token. The formula for this is as follows:

token supply = (A/B) / ((B*B) * 100)

where A = initial digital currency supply and B = national population. In the case of the UK, this produces an initial token supply of 292,675,379,041 where the M0 supply of CBDC was 8,855,000,000 in August 2020. In the model spreadsheet, these two values go into fields BoE!H3 and BoE!I3 respectively on the Central Bank tab. For the UK example, this is labelled BoE for Bank of England.

4.2 Supply Factor

A UK tab has been added to load in the national data for population, national wage with PPP in USD and the monthly inflation rate. This then permits the supply factor to be calculated, which is the formula that underpins the calculation of the subsequent supply values required for the token and CBDC to execute all of the stated ambitions of the product.

However, as there are various scenarios as regards the way the inflation rate is heading as well as its position in regard to the current national inflation target, the total formula is in fact a combination of five different if statements nested to cater for these situations. The scenarios all have the assumption that the national inflation target is more than zero and the variables are: ε = the previous national monthly inflation rate, $\mathbb{Q}$, $\mathbb{R}$, $\mathbb{S}$, $\mathbb{T}$, $\mathbb{U}$ = the various supply factors, α = average wage measured in global purchasing power parity, β = the national inflation rate target, γ = the current monthly national inflation rate, I = 1, o = zero and θ = 365.

- The previous national monthly inflation rate is zero.

$$\varepsilon = o \rightarrow \mathbb{Q} = \left\{ \frac{\alpha}{\theta} \times (\beta - \gamma) \right\}$$

The rationale for incorporating the average wage is to introduce the correct quota amount into the basket of citizens wallets in the first place. Using PPP ensures that globally each country enters into the scheme with fair relative value.

- The current national monthly inflation rate is greater than the national inflation rate target and the previous national monthly inflation rate is greater than or less than zero.

$$\gamma \geq \beta \wedge (\varepsilon < o \vee \varepsilon > o) \rightarrow \mathbb{R} = \left(\frac{\alpha}{\theta} \right) \times \{ I - \left\{ \left| \frac{(\gamma - \varepsilon)}{\gamma} \right| \right\}$$

- The current monthly national inflation rate is less than the national inflation rate target and the previous monthly national inflation rate is greater than or less than zero and the current monthly national inflation rate equals zero.

$$\gamma < \beta \wedge (\varepsilon < o \vee \varepsilon > o) \wedge \gamma = o \rightarrow \mathbb{S} = \{ \left(\frac{\alpha}{\theta} \right) \times \{ \beta - (\gamma - \varepsilon) \}$$

- The current monthly national inflation rate is negative i.e. deflation and the previous monthly national inflation rate is greater than or less than 0.

$$\gamma < o \wedge (\varepsilon < o \vee \varepsilon > o) \rightarrow \mathbb{T} = \left(\frac{\alpha}{\theta} \right) \times \left\{ \beta + \frac{\gamma - \varepsilon}{\frac{\alpha}{\theta}} \times \left\{ \beta - \frac{\gamma - \varepsilon}{\gamma} \right\} \right\}$$

- Should none of the above conditions be met, then the following formula applies.

$$\sim \mathbb{Q} \wedge \sim \mathbb{R} \wedge \sim \mathbb{S} \wedge \sim \mathbb{T} \rightarrow \mathbb{U} = \{ \frac{\alpha}{\theta} \times \left\{ \beta - \left\{ \frac{(\gamma - \varepsilon)}{\gamma} \right\} \right\}$$

- Therefore the final formula for calculating the supply factor is as follows:

$$\mathbb{V} = \begin{cases} \frac{\alpha}{\theta} \times (\beta - \gamma) & \varepsilon = o \\ \frac{\alpha}{\theta} \times \{ I - \left\{ \left| \frac{(\gamma - \varepsilon)}{\gamma} \right| \right\} & \gamma \geq \beta \wedge (\varepsilon < o \vee \varepsilon > o) \\ \frac{\alpha}{\theta} \times (\beta - (\gamma - \varepsilon)) & \gamma < \beta \wedge (\varepsilon < o \vee \varepsilon > o) \wedge \gamma = o \\ \frac{\alpha}{\theta} \times \left(\beta + \left(\frac{\gamma - \varepsilon}{\frac{\alpha}{\theta}} \right) \times \left(\beta - \frac{\gamma - \varepsilon}{\gamma} \right) \right) & \gamma < o \wedge (\varepsilon < o \vee \varepsilon > o) \\ \frac{\alpha}{\theta} \times \left(\beta - \left(\frac{(\gamma - \varepsilon)}{\gamma} \right) \right) \end{cases}$$

4.3 UBS Token Quantity to Buy or Sell

After the initial supply for the token and the CBDC has been calculated and fed into the correct fields on the Central Bank tab in the spreadsheet as Month -1, the first month calculation of what quantity of the token should be sold/burnt/supplied can be established by using the formula below. As before, there are several scenarios that need to be taken into account before arriving at a complete solution. The variables are defined as follows: γ = the current national monthly inflation rate, β = the national target inflation rate, ε = the previous monthly inflation rate, η = the initial token supply, I = 1, κ = 0.1, o = zero, ν = the supply factor and H = 100.

- The current national monthly inflation rate is equal to or higher than the national target inflation rate and the current national monthly inflation rate is equal to or higher than the previous monthly inflation rate.

$$\gamma \geq \beta \wedge \gamma \geq \varepsilon \rightarrow \frac{\left(\frac{\eta \times \left(\left(\left(\left(\frac{\gamma}{\varepsilon}\right) \times \kappa\right) - I\right) \times \mathrm{H}\right)}{H}\right)}{\nu}$$

- The current national monthly inflation rate is equal to or higher than the national target inflation rate and the current monthly national inflation rate is less than the previous national monthly inflation rate.

$$\gamma \geq \beta \wedge \gamma < \varepsilon \rightarrow \left| \frac{\left(\frac{\eta \times \left(\left(\left(\left(\frac{\gamma}{\varepsilon}\right) \times \kappa\right) - I\right) \times \mathrm{H}\right)}{H}\right)}{\nu} \right|$$

- The current national monthly inflation rate is zero and the previous national monthly inflation rate is zero.

$$\gamma = o \wedge \varepsilon = o \rightarrow o$$

- The previous national monthly inflation rate is zero and the current national monthly inflation rate is greater than zero and the current national monthly inflation rate is less than the national target inflation rate.

$$\varepsilon = o \wedge \gamma > o \wedge \gamma < \beta \rightarrow \eta \times \left(\frac{(\gamma \times \kappa)}{\nu}\right)$$

- The current monthly national inflation rate is less than the national target inflation rate.

$$\gamma < \beta \rightarrow \left| \frac{\left(\frac{\eta \times \left(\left(\left(\left(\frac{\gamma}{\varepsilon} \right) \times \kappa \right) - I \right) \times \mathrm{H} \right)}{\mathrm{H}} \right)}{\nu} \right|$$

- The complete formula is thus as follows:

$$\mathbb{W} = \begin{cases} \dfrac{\left(\frac{\eta \times \left(\left(\left(\left(\frac{\gamma}{\varepsilon} \right) \times \kappa \right) - I \right) \times \mathrm{H} \right)}{\mathrm{H}} \right)}{\nu} & \gamma \geq \beta \wedge \gamma \geq \varepsilon \\ \left| \dfrac{\left(\frac{\eta \times \left(\left(\left(\left(\frac{\gamma}{\varepsilon} \right) \times \kappa \right) - I \right) \times \mathrm{H} \right)}{\mathrm{H}} \right)}{\nu} \right| & \gamma \geq \beta \wedge \gamma < \varepsilon \\ o & \gamma = o \wedge \varepsilon = o \\ \eta \times \left(\frac{(\gamma \times \kappa)}{\nu} \right) & \varepsilon = o \wedge \gamma > o \wedge \gamma < \beta \\ \left| \dfrac{\left(\frac{\eta \times \left(\left(\left(\left(\frac{\gamma}{\varepsilon} \right) \times \kappa \right) - I \right) \times \mathrm{H} \right)}{\mathrm{H}} \right)}{\nu} \right| & \gamma < \beta \end{cases}$$

4.4 UBS Token Supply

After the initial supply for the token and the CBDC has been calculated and fed into the correct fields on the Central Bank tab in the spreadsheet as Month -1, the first month calculation of what quantity of the token should be sold/burnt/supplied can be established by using the formula below. As before, there are several scenarios that need to be taken into account before arriving at a complete solution. The variables are defined as follows: γ = the current national monthly inflation rate, β = the national target inflation rate, ε = the previous monthly inflation rate, ω = the previous two-monthly inflation rate, I = 1, κ = 0.1, o = zero, ν = the supply factor, H = 100, ρ = previous token quantity to buy or sell and υ = the previous months supply.

- The previous monthly token quantity to buy or sell is equal to or less than zero and the previous monthly national inflation rate is greater than the national inflation rate target and the previous monthly national inflation rate is greater than the previous two-monthly national inflation rate. Or the previous monthly token quantity to buy or sell is greater than zero and the previous monthly national inflation rate is greater than or equal to zero.

$$(\rho \leq o \wedge \varepsilon > \beta \wedge \varepsilon \geq \omega) \vee (\rho > o \wedge \varepsilon \geq o) \rightarrow \mathbb{X} = \rho + \nu$$

- The previous monthly token quantity to buy or sell is equal to or less than zero and the previous monthly national inflation rate is greater than the national inflation rate target and the previous monthly national inflation rate is less than the previous two-monthly national inflation rate. Or the previous monthly token quantity to buy or sell is equal to or less than zero and the previous monthly national inflation rate is less than the national inflation rate target and the previous monthly national inflation rate is less than the previous two-monthly national inflation rate.

$$(\rho \leq o \wedge \varepsilon > \beta \wedge \varepsilon < \omega) \vee (\rho \leq o \wedge \varepsilon < \beta \wedge \varepsilon < \omega) \rightarrow \mathbb{Y} = \nu$$

- Should none of the above scenarios be fulfilled, then the previous monthly token quantity is returned as the value.

$$(\sim \mathbb{X} \rightarrow \mathbb{Y}) \ \& \ (\sim \mathbb{Y} \rightarrow \nu)$$

4.5 CBDC Supply

After the initial supply for the token and the CBDC has been calculated and fed into the correct fields on the Central Bank tab in the spreadsheet as Month -1, the first month calculation of what quantity of the token should be sold/burnt/supplied can be established by using the formula below. As before, there are several scenarios that need to be taken into account before arriving at a complete solution. The variables are defined as follows: γ = the current national monthly inflation rate, β = the national target inflation rate, ε = the previous monthly inflation rate, ω = the previous two-monthly inflation rate, I = 1, κ = 0.1, o = zero, ν = the supply factor, H = 100, ρ = previous token quantity to buy or sell, υ = the previous months supply, τ = the previous months CBDC supply, μ = the exchange rate of the token to CBDC, υ = CBDC to trade in forex, ξ = the current token quantity to buy or sell, ς = the current token supply.

- The previous monthly token quantity to buy or sell is equal to or less than zero and the previous monthly national inflation rate is greater than the national inflation rate target and previous monthly national inflation rate is greater than the two-monthly previous inflation rate.

$$\rho \leq o \wedge \varepsilon > \beta \wedge \varepsilon \geq \omega \rightarrow \mathbb{A} = (\tau + \left|(\rho \times \mu)\right|) - \upsilon$$

- The previous monthly token quantity to buy or sell is equal to or less than zero and the previous monthly national inflation rate is greater than the national inflation rate target and previous monthly national inflation rate is less than the two-monthly previous inflation rate. Or the previous monthly token quantity to buy or sell is equal to or less

than zero and the previous monthly national inflation rate is less than the national inflation rate target and previous monthly national inflation rate is less than the two-monthly previous inflation rate.

$$(\rho \leq o \wedge \varepsilon > \beta \wedge \varepsilon < \omega) \vee (\rho \leq o \wedge \varepsilon < \beta \wedge \varepsilon < \omega) \rightarrow \mathbb{B} = \tau$$

- The previous monthly token quantity to buy or sell is more than zero and the previous monthly national inflation rate is greater than the national inflation rate target and previous monthly national inflation rate is less than the two-monthly previous inflation rate.

$$\rho > o \wedge \varepsilon > \beta \wedge \varepsilon < \omega \rightarrow \mathbb{C} = \tau + \left(\tau \, x \left(\left(\frac{\xi}{\varsigma}\right) \times \left(\frac{\gamma}{\mathrm{H}}\right)\right)\right)$$

- Should all the above scenarios not be met, then the following applies:

$$(\sim \mathbb{A} \rightarrow \mathbb{B}) \; \& \; (\sim \mathbb{B} \rightarrow \mathbb{C}) \; \& \; (\sim \mathbb{C} \rightarrow \tau)$$